metal/metal film constitution is to dispose an MR-improving layer of a metal not forming solid solution with the element of the magnetic layer, on one side of the magnetic layer that is opposite to the side of the spacer layer. In addition, it is desirable to dispose the first metal film 4a with a shorter electron wavelength, for example, on the outer side of the free layer 1 and to dispose the second metal film 4b with a longer electron wavelength on the outer side of the film 4a.

Where an alloy film is used as the reflective film, its resistance is generally larger than that of pure metal films, if it does not form a completely regular alloy. In other words, the electron wavelength of the alloy film is long. This is advantageous for reflective films and is further advantageous in that the constituent elements of the alloy do not form solid solution with the elements of the neighboring film. The method of forming the alloy film of that type is not limited to direct formation of the alloy film. Alternatively, plural films of alloying systems may be formed through lamination, whereupon an alloy may be formed in the interface of the laminate. However, when the free layer is thin, it is desirable that the specific resistance of the MR-improving layer adjacent to the free layer is lower. (In this connection, when the free layer is thin, the MR-improving layer acts as the nonmagnetic high-conductivity layer in the first embodiment.) Therefore, in that case, it is rather undesirable to form the alloy layer

directly on the free layer.

For the reasons noted above, in the spin valve films 8 as illustrated in Fig. 32, Fig. 33 and Fig. 34, the MR-improving layer 4 acting as the reflective film is so disposed that the metal film (concretely, the first metal film 4a) not forming solid solution with the magnetic layer (free layer 1) is adjacent to the magnetic layer (free layer 1); and the MR-improving layer 4 acting as the reflective film is of a laminate film composed of a plurality of metal films 4a and 4b, or the MR-improving layer 4 is of the alloy layer 4c. The materials for constituting the plural metal films 4a and 4b and the alloy layer 4c are selected on the basis of the knowledge noted above. Where the MR-improving layer 4 is of a laminate film, it is desirable that the first metal film having a shorter electron wavelength is disposed adjacent to the magnetic layer 1 for specular reflection. However when the free layer thickness is thin enough to have spin-filter effect, MR-improving layer 4 is preferred to have low resistivity. The knowledge noted above shall apply to the other constitutive conditions than this.

The MR ratio in the MR film based on the specular reflection, or spin-filter effect when the free layer thickness is thin, noted above, is still kept as such even after annealing. This is because, owing to the appropriate material selection for the MR-improving layer 4 (in that the specifically-selected

material of the layer 4 does not form solid solution with the elements in the neighboring layers), the compositional steepness in the interface in the film could be still maintained as such even after annealing. In other words, the MR characteristics of conventional spin valve films are degraded in annealing owing to the interfacial diffusion or mixing, but the spin valve films of the invention can still maintain their as-deposited MR characteristics even after annealing. Accordingly, the spin valve films 8 of the invention have good thermal stability.

In the prior art spin valve film (e) mentioned above, the Cu/Ag laminate film is to enhance the specular reflection on its interface. This is because the surface roughness of the single-layered Cu film is large, and the Ag film is laminated on the Cu film. The idea for the prior art film (e) is obviously different from that for the spin valve film of the invention in which the specular reflection on the metal/metal interface is intended to be augmented. Specifically, the prior art technique is for surface planarization, while the technique of the invention is for increasing the compositional profile in the metal/metal interface. Obviously, therefore, the material to be laminated differs between the prior art technique and the technique of the invention.

The MR-improving layer which is effective for improving